

Amendments to the Claims

1. (Previously presented) A plasma sputter reactor, comprising:
a vacuum chamber arranged about a central axis and configured to be sealed to a sputter target and comprising a surface material to be sputtered;
a pedestal when in a processing position for supporting a substrate to be processed in opposition to said target across a processing space extending along said central axis between said target and said pedestal;
an RF coil arranged around said central axis; and
an annular magnetic ring producing a DC magnetic field inside of said RF coil at least partially along said axis, being disposed radially outside of RF coil, and being at least partially axially coextensive therewith.
2. (Original) The reactor of Claim 1, wherein said annular magnetic ring has an axial length along said central axis at least as long as that of said coil.
3. (Currently amended) The reactor of Claim 2, wherein said annular magnetic ring extends axially closer to said substrate than does said coil.
4. (Original) The reactor of Claim 3, wherein said coil extends axially closer to said target than does said magnetic ring.
5. (Original) The reactor of Claim 1, wherein said annular magnetic ring comprises an annular array of permanent magnets magnetized along said central axis.
6. (Original) The reactor of Claim 1, wherein said annular magnetic ring comprises an electromagnetic coil encircling said central axis.

7. (Original) The reactor of Claim 1, wherein said magnetic coil is a single-turn band-shaped coil.

8. (Original) The reactor of Claim 1, wherein said target comprises tantalum.

9. (Currently amended) A plasma sputter and processing reactor, comprising:
a vacuum chamber arranged about a central axis and configured to be sealed to a sputter target and comprising a surface material to be sputtered;
a pedestal when in a processing position for supporting a substrate to be processed in opposition to said target across a processing space extending along said central axis between said target and said pedestal;
a single-turn coil arranged around said central axis in a lower half of said processing space and having a tubular shape ~~with an aspect ratio of axial length to tube thickness of at least four;~~
and
an annular magnet ring radially outside of said chamber and being at least partially axially coextensive with said coil.

10. (Original) The reactor of Claim 9, wherein said magnet ring extends from a plane perpendicular to said central axis and passing through said coil to a plane perpendicular to said central axis between said coil and said pedestal.

11. (Original) The reactor of Claim 9, further comprising:
a selective RF power supply passing RF current between opposite ends of said coil; and
a selective DC power supply biasing said coil to a selected voltage.

12. (Original) The reactor of Claim 9, further comprising a magnetron positioned on a side of said target and comprising an inner pole of a first magnetic polarity along said central axis and an outer pole surrounding said inner pole and having a second magnetic polarity opposite said

first magnetic polarity, wherein said annular magnet ring comprises a plurality of magnets having said first magnetic polarity.

13 – 23. (Canceled)

24. (Previously presented) The reactor of Claim 9, further comprising:

an electrically grounded inner shield generally arranged about said central axis, at an upper end thereof forming a dark space against said target, and including means for supporting said single-turn coil and for passing current for it therethrough; and

an outer shield generally arranged about said central axis, positioned outside of said inner shield, extending axially further away from said target than said inner shield, at a lower end thereof protecting a bottom of said chamber and sides of said pedestal from deposition, and including a plurality of circumferentially arranged apertures for passing processing gas to a backside of said inner shield.

25. (Previously presented) A plasma sputter and processing reactor, comprising:

a vacuum chamber arranged about a central axis and configured to be sealed to a sputter target and comprising a surface material to be sputtered;

a pedestal when in a processing position for supporting a substrate to be processed in opposition to said target across a processing space extending along said central axis between said target and said pedestal;

a first electromagnetic coil and a second electromagnetic coil coaxially arranged around said central axis radially outside of said processing space, wherein said second electromagnetic coil is disposed radially outside of said first electromagnetic coil and is at least partially coextensive therewith along said central axis.

26. (Currently amended) The reactor of Claim 25, wherein said first and second electromagnetic solenoid coils are independently powered.

27. (Previously presented) The reactor of Claim 26, further comprising a first power supply powering said first electromagnetic coil and a second power supply powering said second electromagnetic coil.

28. (Previously presented) The reactor of claim 25, wherein said first and second electromagnetic coils comprise respective multi-turn coils.

29. (Currently amended) In a plasma sputter reactor comprising (a) a vacuum chamber arranged about a central axis and sealed to a sputter target, (b) a pedestal supporting a substrate to be processed in opposition to said target across a processing space extending along said central axis between said target and said pedestal, (c) an RF coil arranged around said central axis, and (d) an electromagnetic coil arranged radially outside of said RF coil and at least partially axially co-extensive therewith, a processing method comprising the steps of:

exciting a plasma within said reactor to effect processing of said substrate; and
passing a substantially DC current through said electromagnetic coil of a sufficient level to inhibit diffusion of said plasma to said RF coil.

30. (Previously presented) The method of claim 29, wherein said target comprises a surface region comprising tantalum.

31. (Previously presented) The method claim 29, wherein said exciting step includes applying DC power to said target to effect sputter deposition on said substrate of material from said target.

32. (Previously presented) The method of claim 29, wherein said exciting step including applying RF power to said RF coil to effect etching of said substrate.

33. (New) The method of claim 29, wherein said electromagnetic coil is wrapped around

said central axis.

34. (New) The method of claim 25, wherein said first and second electromagnetic coils are each wrapped around said central axis.

35. (New) The reactor of claim 9, wherein said tubular shape has an aspect ratio of axial length to tube thickness of at least four.